

FLORA
OF THE PRAIRIE PROVINCES

Bernard Boivin

Part IV

(concluded)

Order 73. ARALES

Inflorescence much reduced and functioning like a single flower. Flowers small and crowded into a receptacle-like rachis termed "spadix". Inflorescence subtended and more or less enveloped by a bract termed "spathe". These two structures exhibit a very wide range of morphological variation.

- a. Terrestrial; normal flowers present 127. Araceae
aa. Floating aquatics; flowers highly reduced and normally absent 128. Lemnaceae

127. ARACEAE

(ARUM FAMILY)

Type family of the order. Flowers with the normal components of perianth, stamens and/or ovary. Spathe usually petaloid and showy.

- a. Leaves trifoliate 3. Arisaema
aa. Simple.
b. Leaves ensiform 1. Acorus
bb. Broadly cordate 2. Calla

1. ACORUS L.

CALAMUS

Flowers perfect. Perianth of 6 segments.

1. A. Calamus L. -- Sweetflag (Belle-Angélique, Radote) -- Long, ensiform leaves tufted, mostly around 1 m high, with a somewhat off center midnerve. Spathe seemingly continuing the stem in the manner of some Scirpus or Juncus, the stem-part triangular-flattened, the spathe-part flat and not enclosing, but equitant. The stem-spathe unit is leaf-like, with the spadix arising at an angle from the junction. Early summer. Freshwater shallows. -- sMack, NS-BC, US, Eur.

2. CALLA L.

WATER-ARUM

Flowers all or mostly perfect. Perianth lacking.

1. C. palustris L. -- Calla, Wild Calla (Choucalles) -- Spathe showy, nearly white ventrally, green dorsally, 3-6 cm long, oblong to broadly ovate, long-caudate at tip. Leaves around 1 dm across, broadly ovate, alternate on an elongate rhizome. Somewhat fleshy, especially the stem and petioles. Early summer. Bogs and marshy shores. -- Mack-Aka, L-NF, NS-BC, US, Eur.

Symplocarpus foetidus (L.) Nutt. was reported from Winnipeg by Scoggan 1957 on the basis of a specimen preserved at the Manitoba Provincial Museum in Winnipeg. It is a sample of Lysichiton americanum Hultén & St John and in all likelihood came either from a garden or from a planting in the wild. An earlier report of Jackson 1922 is not substantiated by any specimen that Scoggan or ourself could locate and is herewith discounted as improbable.

3. ARISAEMA Mart.

INDIAN TURNIP

Flowers unisexual. Perianth absent. Spadix prolonged beyond the flower-bearing base.

1. A. triphyllum (L.) Schott var. triphyllum (A. atrorubens (Aiton) Blume) -- Jack-in-the-Pulpit, Indian Turnip (Petit pêcheur, Oignon sauvage) -- Perennial herb from a corm, with 1-2 large, basal, trifoliate leaves. Leaflets up to 2 dm long, ± ovate, the lateral ones strongly asymmetrical. Spathe less than 1.5 dm long, hooded, brown-purple with the reticulate nervation outlined in pale green. Late spring and early summer. Rare in rich deciduous woods: Emerson and Dufferin. -- NB-sMan, US.

Grades eastward into var. Stewardsonii (Britton) Stevens with a spathe tapered at base into the peduncle, its tube more strongly corrugated, the throat striped in white and purple on the inner face, the hood green.

128. LEMNACEAE

DUCKWEED FAMILY

Free-floating aquatics, very small and normally sterile, reproducing mainly by budding. Inflorescence, when present, reduced to 2-3 minute flowers. Staminate flower reduced to a stamen. Pistillate flower reduced to an ovary. The leaf-like structure is termed "thallus". Flowering very rare or very rarely observed.

The recently published monograph of Lemnaceae by E.H. Daubs, Ill. Biol. Mon. 34: 1-118, 1965, is not to be trusted, especially its distribution maps. These are made up mainly of imaginary dots, mostly equidistant. We have also come across a few similar maps in some other genera, Arnica, Lupinus, Rumex,

etc. Such maps may have the outward appearance of paintaking scholarship, but they lack its substance, the essential dot to specimen correlation.

- a. Rootlets fascicled 1. Spirodela
 aa. Rootlets none or only one per leaf-like unit 2. Lemna

1. SPIRODELA Schleiden

Roots in a small fascicle arising at the near end and underneath the leaf-like thallus.

1. S. polyrhiza (L.) Schleiden -- Duckweed, Water-Flaxseed -- (Lentille d'eau) -- Smallest in our flora but for Lemna minor. Thalli about 5 mm across, leaf-like, clustered, green above with an off center purple spot and radiating purple nerves; purple below, the cluster of rootlets attached opposite the purple spot. Free floating at the surface of quiet waters in company of Lemna minor and normally less abundant than the latter. -- NS-BC, US, (CA), Eur, (Afr, Oc).

2. LEMNA L.

DUCKWEED

Rootless or the root arising from the far end of the thallus.

- a. Rootlet present 2. L. minor
 aa. Absent; thalli larger and connected by stipe-like bases 1. L. trisulca

1. L. trisulca L. -- (Canillée, Cannelée) -- Floating under water and forming loose, open networks up to 1 dm across. Thalli 4-10 mm long, lanceolate, green, finely white-punctate, seemingly trilobed when budding. Stipe about as long as the limb. Quiet waters. -- K-Aka, NS-BC, US, (CA), Eur, (Afr, Oc).

2. L. minor L. -- Duckweed (Lentille d'eau, Merde de grenouille) -- Our smallest plant, its thallus only 1-3 mm long and growing in clusters less than 1 cm across. Rootlet 1-2 cm long, simple and pendant from under the far end of the thallus, the latter pale green and nerveless. Free floating at the surface of quiet waters, often in huge numbers towards the end of the summer. -- K-Aka, SPM, NS-BC, US, (CA, SA).

Order 74. TYPHALES

Reduced type of the preceding order. Flowers unisexual and often without perianth, hence reduced to an ovary or stamen(s). Fruit an achene. Spathe green and leaf-like, fugaceous.

- a. Flowers in globose heads 129. Sparganiaceae

aa. In dense, cylindrical heads 130. Typhaceae

129. SPARGANIACEAE (BURREED FAMILY)

Perianth of 3-6 tepals. Monotypic.

1. SPARGANIUM L. GOOSE-GRASS

Aquatic herbs with the flowers in globose heads in a moniliform inflorescence on a sinuous rachis.

a. Stigmas 2, the style being bifid 1. S. eurycarpum

aa. Only one stigma, the style entire.

b. Fruiting head 1.2 cm wide or less, the beaks 1.5 mm long or less; staminate heads only 1-2; inflorescence simple.

c. All heads (or peduncles) axillary; beaks 0.5-1.5 mm long 7. S. minimum

cc. At least one of the pistillate heads borne half way up an internode 8. S. hyperboreum

bb. Fruiting head larger, up to 3.5 cm wide, the beaks mostly over 1.5 cm long; staminate heads 2 or more, except S. glomeratum.

d. Inflorescence of 2 or more branches, each bearing 2 or more heads.

e. Styles all or mostly bifid 1. S. eurycarpum

ee. Styles entire 2. S. americanum

dd. Inflorescence simple and spiciform to racemiform below.

f. Pistillate heads (or their peduncles) all axillary 2. S. americanum

ff. At least one pistillate head borne about half way up an internode or opposite a leaf or bract.

g. Staminate heads only 1-2, less numerous than the pistillate ones and contiguous to the upper pistillate head; in fruit the rachis is barely, if at all, prolonged beyond the upper pistillate head 3. S. glomeratum

gg. Staminate heads more numerous and forming a moniliform inflorescence on a very long rachis which persists in fruit.

h. Leaves 5-10 mm wide; beaks 2.5-3.0 mm long. Normally an emersed and erect plant 6. S. multipedunculatum

hh. Leaves mostly narrower, less than 7 mm wide.

- i. Normally submerged with only the inflorescence protruding above water; beaks \pm 2 mm long; lower head usually pedunculate 5. S. angustifolium
- ii. Normally emerged and stiffly erect; beaks (2)-4 mm long; all or nearly all heads sessile or nearly so 4. S. chlorocarpum

Aquatic plants of shallow waters and exundated shores are normally subjected to drastic ecological variations and may respond by equally drastic morphological adaptations, hence their identification may present some unusual difficulties. This is especially the case with our species of Sparganium and their identification is largely based on characters drawn from the inflorescence. The following general characterizations may help the beginner. One species is rarely introduced, S. glomeratum, and is readily spotted by the different arrangement and ratio of pistillate and staminate heads. Two species, S. hyperboreum and S. minimum, are generally smaller with smaller heads and shorter beaks. The largest species, S. eurycarpum, has rather long stigmas and most of them are paired (always single in our other species). Also the inflorescence is branched (simple in the others, except sometimes S. americanum) and the mature achene is obconical (ovoid to ellipsoid or fusiform in the other species). The other four species center around S. americanum and will be discussed under the latter name.

Our treatment will be found to be fairly congruent with those of Fernald 1950 and Gleason 1952. But there are quite a few dissonances with the more recent text and illustrations of Hitchcock 1969.

Sterile leaves of submerged forms are often mistaken for Vallisneria. In Sparganium the leaf cells are unusually large, mostly 0.5-1.0 mm long and 0.2-0.3-(0.5) mm wide, thus their outline is readily observed by the unaided eye. In Vallisneria they are only 1/10 as big and barely detectable with a hand lens.

1. S. eurycarpum Eng. -- Styles all or mostly bifid, the stigmatic branches 2-3 mm long. Largest and coarsest, mostly around 1 m high, the leaves around 1 cm wide. Style, including the stigmas, about 5 mm long. Achene obconical, truncate at summit. Early summer. Muddy shores. -- NF-(SPM), NS-BC, US.

Porsild 1943 extended the range to Fort Norman, Mackenzie, but we have found no justifying specimen at CAN or elsewhere.

2. S. americanum Nutt. (S. androcladum (Eng.) Morong; S. fluctuans (Morong) Rydb.) -- The variable and nondescript species of the genus: styles entire, of middle size, and the heads

(or branches, or peduncles) axillary. Not quite so coarse as the first. Heads numerous, both the staminate and pistillate, the fruiting ones 1.5-2.5 cm across. Beaks 2-(4) mm long. Achene fusiform, usually with a faint constriction around the middle. First half of summer. Mostly around sloughs and shores with a fluctuating water level. -- (L-SPM), NS-0, S-BC, US.

Usually subdivided further into three species. Lesser plants with shorter stigmas, perianth and anthers, smaller heads, etc. are then termed S. fluctuans. The correspondingly larger plants are then S. androcladum, while the more average plants are retained as S. americanum.

Morphologically S. americanum is a central type and is best detected by elimination. If its inflorescence is branched, it is usually separated from S. eurycarpum on the basis of the number of stigmas or the shape of the achene.

If the inflorescence is a single zigzag spike (racemose or not at base) of heads, it is placed in S. americanum if all the pistillate heads are axillary, the lower 1-(2) being usually pedunculate while the others are sessile. Typically the heads are all sessile and axillary or nearly so in S. chlorocarpum, but for the lowermost head which is borne halfway up the internode. In S. angustifolium the lowermost head is also interaxillary, but it is commonly pedunculate, although it may be sessile. And in S. multipedunculatum, a somewhat broader-leaved species, the lowermost head is typically pedunculate and axillary, while the next head is sessile and interaxillary.

The variation in size of fruiting heads is not random but there are broad zones of overlap. The smaller heads belong to S. angustifolium, the larger ones to S. multipedunculatum.

The leaves are narrower in S. angustifolium and S. chlorocarpum, mostly 3-5 mm wide. They are broader in S. americanum and S. multipedunculatum, the main ones mostly ± 7 mm wide. The spacing of the nerves is related to the width of the leaves.

S. angustifolium is typically a submerged plant with long and flaccid leaves reaching the surface. The others are normally shore plants. S. chlorocarpum has a rather short stem, the leaves are stiff and somewhat channelled, and the beaks tend to be over 3 mm long. S. multipedunculatum tends to be of average height and S. americanum is the tallest of the series.

All these characters vary and not always in unison. It may be that specific rank is not justified for all these taxa. But we are retaining the present classification for want of a better one.

3. S. glomeratum Laest. -- Inflorescence very short, of 3-6 pistillate heads and only 1-2 staminate ones. About as large

as the last. Rachis of the inflorescence not prolonged beyond the upper pistillate head, or prolonged by only a few mm, hence the staminate head(s) is contiguous with the upper pistillate one. Lower head often borne opposite a leaf. Fruiting heads crowded, about 1.5 cm across. Beaks 1.5-2.0 mm long. First half of summer. A rare and apparently introduced plant of quiet waters: Glenevis. -- Aka, L, (Q)-O, Alta-BC, US, Eur.

The following localities have been checked: Big Delta (DAO), College (DAO), Goose Bay (DAO), Black Sturgeon Lake (SFS), Glenevis (ALTA, DAO), Graham Island (DAO), Kathlyn Lake (DAO), and from Minnesota.

4. S. chlorocarpum Rydb. (var. acaule (Beeby) Fern.; S. acaule (Beeby) Rydb.) -- Stem short, usually only 1-3 dm high, much overtopped by at least as much again by the stiff and nearly erect leaves. Sometimes submerged and with flaccid leaves, but normally emerged and the leaves carinate and \pm conduplicate. Lowest head typically sessile and borne half way up the internode or sometimes opposite a leaf. Fruiting heads 1.5-2.5 cm across, all sessile or subsessile. Mid summer. Frequent in wet places and shallow water. -- L-SPM, NS-O, S-BC, US.

5. S. angustifolium Mx. -- Goose-Grass (Rubanier) -- The common submerged aquatic type with the leaf tips floating at the surface and the inflorescence partly emerged. Sometimes stranded and erect, the leaves then rounded on back. Lowest bract usually some 50% broader towards the base and also quite often membranous margined. Lowest head on an obvious peduncle which arises half way up an internode. Fruiting heads 1.2-2.0 cm across. First half of summer. Common in quiet waters, usually in less than 1 m deep. -- (G, K)-Mack-Aka, L-SPM, NS-(PEI)-NB-BC, US, (Eur).

6. S. multipedunculatum (Morong) Rydb. (S. simplex AA.) -- Like a larger version of S. chlorocarpum. Stem taller and not so conspicuously overtopped by leaves. Fruiting heads 2-3 cm wide, the lower one often pedunculate and axillary, the second one usually sessile and interaxillary. First half of summer. Near water's edge. -- (Mack)-Y-Aka, NF-(SPM), NS-PEI-(NB)-Q-(O)-Man-BC, US.

The name S. simplex Hudson has largely fallen into disuse. British botanists now use S. emersum Rehm. and North-Americans generally prefer S. multipedunculatum. We have not yet investigated the basis for regarding the American plants as a distinct species. Authors of the last century used S. simplex in quite a broad sense and older records should not be accepted without checking the justifying sheets.

In a recent paper J.L. Reveal (Taxon 19: 796-7. 1970) has clearly pointed out that S. simplex Hudson is superfluous, hence illegitimate, and the correct name for the European plant is

S. emersum Rehm. With this nomenclature we agree. Then Reveal proceeds to distinguish the American plants as S. emersum var. multipedunculatum (Morong) Reveal without explaining the basis for his taxonomy, although there is a hint that he may have accepted the treatment of Hitchcock 1969.

The recent treatment by Hitchcock 1969 does not dovetail well with our own sorting. Hitchcock would recognize S. simplex as widespread in North America along with a var. multipedunculatum equally widespread. The discrepancy with our text is perhaps only a matter of names, S. simplex sensu Hitchcock being partly equivalent to our S. americanum. The latter taxon is not mentioned by Hitchcock although it seems to be a part of his illustration of S. simplex.

7. S. minimum (Hartm.) Fries -- Heads few and only about 1 cm across. Stem rather thin and weak. Leaves variable, usually less than 5 mm wide. Just before mid summer. Shallow and cool waters. -- seK-Mack, Aka, L-(NF), NS-(PEI)-NB-BC, US, Eur.

8. S. hyperboreum Laest. -- Like the last but the style and stigma shorter, neither over 0.3 mm long, and the heads not all axillary. Just before mid summer. Shallow, acid, cold waters. -- G, K-Aka, L-SPM, NS, Q-nO-nMan, (swAlta), Eur.

130. TYPHACEAE

(CATTAIL FAMILY)

Flowers further reduced to their stamens or ovary and a number of subtending bristles. Monotypic.

1. TYPHA L.

CATTAIL

Staminate and pistillate flowers borne in separate parts of the spike. Spathe soon deciduous.

- a. Leaves all or mostly 1.0-1.5 cm wide 1. T. latifolia
 aa. Narrower, only (0.4)-0.5-0.8-(1.0) cm
 wide 2. T. angustifolia

1. T. latifolia L. -- Cattail, Bulrush (Quenouille, Massette) -- A conspicuous and taller marsh plant, with a compact and dark brown inflorescence \pm overtopping its foliage. About 1.5 m high. Inflorescence continuous, the pistillate part 1.0-1.5 dm long, becoming 2.0-2.5 cm thick at maturity, the staminate part shorter. Early summer. Common in ditches and in marshy shallows, not very tolerant of alkali. -- seK-Aka, NF, NS-BC, US, (CA), Eur.

IX. T. glauca Godron -- Hybrid of our two species and growing with its parents; more or less variable and intermediate in height, width and length of the leaves and pistillate spikes, and discontinuity of the staminate spike. Rare: Vita, Otterburne. -- NS, Q-Man, US, (CA, Eur).

2. T. angustifolia L. -- Cattail (Quenouille, Massette)
 -- Quite similar to the first and often growing with it. Somewhat taller. Leaves narrower and overtopping the inflorescence. Pistillate part of the inflorescence 1-2 dm long, paler brown, becoming 1.0-1.5 cm thick at maturity. Staminate spike usually longer and separated from the first by an interval of 1.5 cm or more. First half of summer. Rare in marshy places: Gimli, Otterburne, Vita. -- NS-seMan, US, Eur, (Afr).

This species is perhaps currently extending its range.

Sub-class 4. ACHENIDAE

Carpels free, or only one, maturing into one-seeded achenes.

- a. Carpels 4 or more.
 - b. Carpels very numerous 131. Alismataceae
- bb. Only 4 carpels.
 - c. Leaves opposite 136. Zannichelliaceae
 - cc. Alternate, but the upper sometimes opposite.
 - d. Flowers 2 on an axillary rachis
 135. Ruppiaceae
 - dd. Flowers more numerous and forming a
 terminal spike 133. Potamogetonaceae
- aa. Carpel solitary.
 - e. Leaves all basal 134. Lilaeaceae
 - ee. Borne on the stem.
 - f. Leaves opposite 137. Najadaceae
 - ff. Alternate 132. Zosteraceae

Order 75. ALISMATALES

Monotypic.

131. ALISMATACEAE (WATER-PLANTAIN FAMILY)

With numerous free carpels maturing into as many achenes and obviously resembling Ranunculus, but the flowers trimerous, with 3 sepals and 3 petals.

- a. Carpels disposed in a single verticil 1. Alisma
- aa. Not verticillate and more numerous in a dense
 globose head; flowers larger 2. Sagittaria

1. ALISMA L.

WATER-PLANTAIN

Fruit a verticil of achenes.

- 1. A. Plantago-aquatica L. (var. americanum R. & S., var.

brevipes (Greene) Farw., var. parviflorum (Pursh) Farw.; A. brevipes Greene; A. Geyeri Torrey; A. gramineum K.C. Gmelin. A. subcordatum Raf.; A. triviale Pursh) -- Water-Plantain, Mud-Plantain (Plantain d'eau, Flûteau) -- Leaf nervation of (5)-7 longitudinal main nerves connected ladder-wise by numerous small nerves. Annual or tufted perennial with the leaves all basal and ovate, varying to nearly linear. Panicle lax, its branching verticillate. Flowers less than 1 cm across, white to pinkish. Summer. Frequent on muddy shores and shallows. -- (NF), NS-BC, US, (CA), Eur, (Afr).

Quite variable and often subdivided in 2 to 5 species. Commonly the name A. Plantago-aquatica will be restricted to the paleogeon plants and the neogeon ones will then be called A. triviale. The latter may be further restricted to plants with larger leaves and flowers, while A. subcordatum will designate smaller-flowered plants, A. lanceolatum the narrower-leaved plants, and A. gramineum the very narrow-leaved and \pm submerged plants. All characters grade into one another and appear to be neither geographically restricted nor clearly correlated. Much of the variation in leaf width is obviously related to water levels. The degree of branching of the inflorescence and the number of grooves on the back of the achene have also been adduced as diagnostic criteria. The grooving of the back of the achene is perhaps related to maturity. Submature achenes usually show two grooves between three dorsal ridges. Fully mature achenes are more likely to exhibit a single central ridge. The branching will vary with the size of the inflorescence and in more vigorous plants the lower branches may bear 2-(3) verticils of flowers, while in smaller plants all branches will bear a single terminal verticil or umbell of flowers.

The flower colour is not always obvious in herbarium specimens and is rarely anything but white or nearly so. Anthers vary in size but not always the way they are expected to.

As long as we cannot correlate clearly these various diagnostic character, we are inclined to regard Alisma Plantago-aquatica as a single plastic species with four main ecological forms.

Here is our understanding of the variation within this species. Usually it is an annual plant. Seeds deposited on the mud in the fall will germinate under water the following spring and will produce filiform or narrowly ribbon-like leaves. These leaves are more or less evanescent. If the water level remains high, the later leaves will also be ribbon-like, but longer and larger, up to 1 cm wide, and will resemble those of Vallisneria or Sparganium angustifolium. If the water level is slow in receding, the later leaves will likely be lanceolate, but if the water recedes earlier the leaves will grade

to lanceolate then to ovate by flowering time. More vigorous plants will tend to produce ovate to cordate leaves that may be up to 1.0-1.5 dm long, they will also tend to develop a basal corm that will often overwinter and produce rather vigorous plants the following season.

Earlier leaves are more or less evanescent and herbarium specimens showing transitional forms are not common since most plants are collected when they are already flowering or fruiting and the water level has already completely or largely receded.

Our understanding of the variations of this species may be expressed at the rank of form as follows.

1. *F. Plantago-aquatica*. Leaves emerged and narrowly ovate to oval or cordate, (3)-5-12-(15) cm long, (2)-3-8-(12) cm wide.

2. *F. emersum* Boivin. Plants at first submerged, and producing filiform leaves, these evanescent and, as the water level recedes, replaced by \pm lanceolate leaves, (2)-4-6-(8)cm long, (0.5)-1.0-2.0-(3.0) cm wide. Forma nova, in primis submersa, deinde emersa et foliis \pm lanceolatis. Typus: M.-Victorin 20410, Québec, Longueuil, sur les grèves du Saint-Laurent, en face de l'île Plate, 29 sept. 1924 (QFA). Paratypi varii in QFA servantur.

3. *F. vallisneriifolium* Boivin. Plants submerged all summer, producing long and flaccid leaves partly floating at the surface, up to 1 m long, mostly 5-10 mm wide. Forma nova, foliis partim fluitantibus, ad 1 m long., saepius 5-10 mm lat. Typus: Louis-Marie, Québec, Longueuil, 1 sept. 1924 (QFA 1786). Paratypi varii servantur in QFA.

4. *F. filiforme* Boivin. Foliage completely submerged all summer, the inflorescence tending to be partly emersed. Leaves \pm filiform, 1-3 mm wide. Forma nova, omnino submersa vel inflorescentia partim emersa, foliis angustissimis, 1-3 mm lat. Typus: Cinq-Mars & Raymond 615, Québec, co. Iberville, Sabrevois, bords vaseux du Richelieu, 29 août 1953 (QFA). Paratypi inveniuntur in QFA.

2. SAGITTARIA L.

ARROWHEAD

Like Alisma, but with more numerous carpels in a globose head.

- a. Lower flowers subsessile 1. S. rigida
 aa. All flowers on similarly elongated pedicels.
 b. Bracts deltoid to elliptic, shorter than the sepals 2. S. latifolia
 bb. Bracts triangular-lanceolate to linear-lanceolate and longer than the sepals; achene

beak very short 3. S. cuneata

1. S. rigida Pursh -- Scape \pm arched and rather sharply bent at the base of the inflorescence, the latter erect. Leaves overtopping the inflorescence, mostly lanceolate and usually cuneate at base. Pedicels dimegueth, the flowers of the lowermost verticil being pistillate and subsessile, the other flowers staminate and borne on pedicels 1-3 cm long. Mid summer. Muddy shores and shallow receding waters; Sanford and in the extreme southeast corner. -- Q-sMan, US, (Eur).

2. S. latifolia W. var. latifolia (var. obtusa (Muhl.) Wieg.) -- Wapato, Arrowhead (Wapatou, Flèche d'eau) -- Inflorescence a raceme of verticillate flowers, sometimes compound at the base. Herbage glabrous. Leaf conspicuously sagittate, with the basal lobes about as long as the body of the blade. Nervation as in Alisma, but the main nerves more numerous, some of them recurved and ending in the tip of the lobes. Flowers white, showy, 2-4 cm across. Achene 2.5-3.5 mm long, conspicuously winged, its beak mostly 1.0-1.5 mm long and horizontally deflexed. Mid summer. Marshy places and shallow waters. -- NS-BC, US.

In the southeastern USA, barely entering Ontario, there is a pubescent var. pubescens (Muhl.) J.G. Sm. Otherwise S. latifolia is quite a variable plant, like the first, and many extremes of variation and ecological forms have received names, usually at the varietal level.

3. S. cuneata Raf. -- Wapato -- Similar but tending to be smaller. Petals \pm 2 cm long. Achene only 2.0-2.5 mm long, flattened rather than winged, its beak subapical, erect, 0.1-0.4 mm long. Mid summer. Around sloughs and along creeks. -- (K-Y), L, (NF), NS, NB-BC, US.

Order 76. APONOGETONALES

Flowers borne on one side of a flattened axis or spadix.

132. ZOSTERACEAE (EELGRASS FAMILY)

Flowers much reduced, bearing only one tepal and either one stamen or one carpel.

1. ZOSTERA L. EELGRASS

Monoecious.

1. Z. marina L. -- Eelgrass, Grass-Wrack (Mousse de mer, Herbe à Outardes) -- Quite similar to a narrow-leaved Potamogeton with a very flat stem but without stipules. Lower leaves with a tubular sheathing base. Inflorescences not obvious,

superficially similar to a leaf and about as wide, the leaf-like spathe folded over the spadix. Leaves 3-4 mm wide and mostly over 1 dm long. Early summer. Submerged in sheltered sea-coast shallows just below tide level: Churchill. -- G, K, (Aka), L-NF-(SPM), NS-Q-(nO)-nMan, BC, US, Eur.

The neogean plants are said to differ by their narrower leaves with fewer nerves, but this reported difference did not come out clearly in the material at hand.

Order 77. POTAMOGETONALES

Flowers more or less reduced like the last but subverticillate in a terminal spike, not on a spadix.

- a. Carpel solitary; leaves all basal 133. Lilaeaceae
- aa. Carpels 4; stem leafy.
 - b. Inflorescences terminal; achenes sessile 132. Potamogetonaceae
 - bb. Inflorescences axillary; achenes very long stipitate 134. Ruppiaceae

133. POTAMOGETONACEAE (PONDWEED FAMILY)

Submerged aquatics with spikes of tetramerous flowers. Perianth lacking. No spathe or spadix.

1. POTAMOGETON L. PONDWEED

The only genus. Stipules present, usually elongate, fused together to form a sheath, sometimes also fused with the leaf base to form a sheathing base similar to the leaf-sheath of the Grasses.

The emphasis of our treatment is deliberately on habit and gross morphology; this should be adequate for positive identification of full grown colonies and the bulk of herbarium material. Many diagnostic characters have been derived from the details of the flowers and fruits, from the anatomy of stems and leaves; these will be found in monographs and manuals of aquatic plants; they should provide for the positive identification of sterile shoots, fragments, and even seeds from an animal stomach or winter buds from a muddy bottom.

- a. Leaves minutely serrulate.
 - b. Leaf blade divergent from the summit of its sheathing base 4. P. Robbinsii
 - bb. Leaves diverging right from the node and free from the stipular sheath 5. P. crispus
- aa. Entire.
 - c. Floating leaves absent or similar to the submerged ones.

- d. Leaves narrow, less than 4 mm wide Group A
- dd. Broader Group B
- cc. Leaves dimorphic, the floating ones different from the submerged.
 - e. Submerged leaves reduced to their coarse and elongated petioles 15. P. natans
 - ee. Submerged leaves with distinct limb and often sessile Group B

Group A

Leaves all submersed and narrow.

- a. Leaf with fused stipules forming a sheath and ligule, like a Grass, the blade divergent from near the middle or the summit of the sheath.
 - b. Leaves linear, (3)-5-(8) mm wide 4. P. Robbinsii
 - bb. Leaves filiform and narrower.
 - c. Stigma borne on the side of a short and broadly triangular beak; leaf tips attenuate 3. P. pectinatus
 - cc. Stigma broad and sessile on the top of the achene; leaf tips acute to rounded.
 - d. Leaf and stipules adnate for 2 cm or less, the sheath margins also fused along the ventral side 1. P. filiformis
 - dd. Main leaves and their stipules adnate for 2-5 cm into a broader sheath which is open ventrally 2. P. vaginatus
 - aa. Leaf free from the stipules and diverging from the node.
 - e. Stem very flat and over 1 mm wide, more than half as wide as the leaves 6. P. zosteriformis
 - ee. Stem not so flat or narrower.
 - f. Achene 3-4 mm long; leaves 2-4 mm wide with a conspicuous whitish midnerve 10. P. obtusifolius
 - ff. Achene shorter; leaves narrower (except sometimes P. Friesii).
 - g. Spike 3-5 mm long, on a peduncle less than 1 cm long 7. P. foliosus
 - gg. Spike and peduncle longer.
 - h. Larger leaves 2-3 mm wide, rounded and mucronate at tip 8. P. Friesii
 - hh. Larger leaves not so wide and usually acute 9. P. pusillus

Group B

Leaf blades broad, over 5 mm wide and often dimorphic.

- a. Leaves sessile, cordate or clasping at base, all submerged.

- b. Leaves linear and of uniform width, (3)-5-(8) mm wide 4. P. Robbinsii
- bb. Leaves ovate to narrowly lanceolate, the main ones at least 1 cm wide.
- c. Stipules 2.5 cm long or more, conspicuous and persistent 16. P. praelongus
- cc. Shorter, 2 cm long or less, and evanescent or soon reduced to fibrous shreds..... 17. P. perfoliatus
- aa. Leaves rounded or cuneate at base, often petiolate or dimorphic.
- d. Submerged leaves 2 cm wide or more, often petiolate; stipules 3 cm long or more.
- e. Leaves conduplicate-falcate, with 12 or more longitudinal nerves to each half of the limb 13. P. amplifolius
- ee. Leaves straight and flat or crisp-margined; longitudinal nerves fewer (P. illinoensis)
- dd. Leaves narrower and mostly sessile; stipules less than 4 cm long.
- f. Peduncle about twice as thick as the stem; leaves (2)-3-5-(8) cm long 14. P. gramineus
- ff. Peduncle barely, if at all, thicker than the stem; submerged leaves usually longer.
- g. Floating leaves present, 2-3 times wider than the submerged ones, the latter less than 1 cm wide 11. P. epihydrus
- gg. Floating leaves usually lacking, or if present about as wide as the submerged ones, the latter mostly 1.0-1.5 cm wide 12. P. alpinus

1. P. filiformis Pers. (var. borealis (Raf.) St. John, var. Macounii Morong; P. interior Rydb.) -- Of a bushy growth and dark green to blackish, being very branchy with numerous filiform leaves longer than the internodes. Leaves mostly around 1 dm long and usually less than 1 mm wide, acute to obtuse at tip, adnate to the sheath of stipules for less than 2 cm, the latter also fused on the ventral side for at least part of their length when young, forming a tube mostly less than 1 mm wide. Inflorescence \pm moniliform with the lowest cluster remote, the lowest internode being about as long as 1/3 of the inflorescence. Achene 2-3 mm long. Stigma broad and flat, sessile on the summit of the achene. First half of summer. A bottom dweller, usually in shallow waters, quiet to fast flowing, over sandy bottom. -- G-Y-(Aka, L)-NF, NS-(PEI)-NB-BC, US, Eur.

Spikes of american plants average smaller, the internodes tending to be shorter (= var. borealis). But this is only a statistical variant as the range of variation is nearly the same

on both sides of the Atlantic. Another commonly recognized variety is the larger-leaved var. Macounii, an extreme of variation of sporadic occurrence.

2. P. vaginatus Turcz. -- Like the first but the sheaths broader and obvious, the main ones usually 2-5 mm across, the edges free on the ventral side, but the leaf adnate for 3-8 cm. Leaf blades 1-2 mm wide, obtuse or rounded and mucronulate at tip. Inflorescence with more numerous and nearly equidistant clusters. Achenes larger, 3.0-3.5 mm long. Early summer. Usually in cold and quiet water less than 1 m deep. -- seK-Y-(Aka, L)-NF, NS-(PEI), Q-Alta-(BC, US, Eur).

3. P. pectinatus L. -- Sago -- Achene produced into a short conical beak, less than 1 mm long, bearing the stigma on one side. Leaves mostly around 1 mm wide, adnate to the stipular sheath for 1-3 cm, tapered to a long, acute tip. Sheaths less than 1 mm across, tightly enclosing the stem or subtended branch. Inflorescence like P. vaginatus. Achene 3.0-3.5 mm long. Early summer. Quiet, muddy waters. -- (Mack)-Y-(Aka), NF-SPM, NS-BC, US, (CA, SA), Eur, (Afr, Oc).

4. P. Robbinsii Oakes -- Foliage conspicuously pectiniform, the leaves stiff, distichous, divergent at about a 45° angle and closely set. Not very branchy. Leaves dark green, long linear, less than 1 dm long and less than 1 cm wide, adnate to the stipular sheath for less than 1 cm, finely serrulate, but the serrations deciduous. Sheaths overlapping, disintegrating to whitish fibers. Inflorescence usually a lax corymb of spikes. Early fall or perhaps usually sterile. Mostly in quieter and calcareous waters around 1 m deep. -- NS, NB-BC, US.

Rare or perhaps merely overlooked because it is a bottom dweller and commonly sterile. For our area we know of no specimens other than those at DAO. The localities are: Bissett, Wildnest River, Limestone Lake and Glenevis.

5. P. crispus L. -- Usually sterile, but the leaves serrulate and ± oblanœolate. Stems pinkish, strongly contrasting the dark green leaves, the latter crisp-margined, all alike and submerged, with only 3 longitudinal nerves, and free from the stipules. Achene weakly contracted into a beak more than half as long as the body. Shortly before mid summer. Locally naturalized in larger rivers: Saskatoon and The Elbow at Calgary. -- (NS), Q-O, S-BC, US, Eur.

6. P. zosteriformis Fern. (P. compressus AA.; P. zosterifolius AA.) -- Stipules especially obvious, whitish, about as wide as the leaves, although shorter, and free from one another and from the leaves. Stem strongly flattened. Leaves ribbon-like, 1-2 dm long and 2-4 mm wide, obtusish and short-acuminate at tip. Early summer. Clear, quiet water, up to 1½ m deep. -- Mack, (Aka), NS, NB-BC, US.

Quite similar to the paleoagean *P. compressus* L. (or *P. zosterifolius* Schumacher), the two differing in a number of minor ways, of which the more obvious is in the stipules. In the American plant the conspicuous stipules are nearly white and persist most of the summer. In the European plant the stipules are much less colour-obvious and soon they disintegrate.

7. *P. foliosus* Raf. (var. *macellus* Fern.) -- Spike and peduncle shortest. Herbage of this and the next three species quite similar to *P. zosteriformis* but much smaller throughout; stem strongly flattened but less than 0.5 mm wide, etc. Resembles *P. pusillus*, but in the latter the 3-4 upper pairs of leaves are opposite. Leaves usually all alternate except the uppermost pair, acute at tip, without basal glands. Stipules 1 cm long or less, filmy and fragile, but not disintegrating to fibrous shreds. Achene with a narrow and undulate dorsal wing. Early summer. Quiet streams and larger lakes. -- sMack, NS-BC, US, (CA).

The range was extended to Yukon by Roland 1947, repeated by Boivin 1967. But Yukon was not included in the range by Roland 1966 and one may suppose that the 1947 report may have been based on some misidentification or due to a lapsus calami.

8. *P. Friesii* Rupr. -- Like the last but the achenes rounded on back and the larger leaves somewhat more than 2 mm wide. Glands usually present at the base of the leaf. Stipules 1 cm long or less, soon disintegrating to whitish fibrous remnants. Spike 7-15 mm long, on a peduncle 1.5-5.0 cm long. Achene 2-3 mm long. Early summer. Freshwater lakes. -- seK-(Mack), Aka, (L)-NF, NS-PEI-(NB)-Q-O-(Man)-S-Alta-(BC), US.

9. *P. pusillus* L. var. *pusillus* (var. *minor* (Biv.) Fern. & Schub., var. *mucronatus* (Fischer) Graebner; *P. Berchtoldii* Fieber, var. *polyphyllus* (Morong) Fern.) -- A middling type in relation to the next and the last three. Leaves less than 1 dm long, 2 mm wide or less, acute to obtuse or mucronulate at tip, with a pair of prominent, and somewhat translucent basal glands, these sometimes obscure. Stipules 0.5-1.5 cm long, filmy, often evanescent, but not disintegrating to shreds. Achene not ridged on back. Early summer. Sloughs and slow moving waters. -- G, sMack-(Y)-Aka, L-(NF), NS-BC, US, (CA), Eur, (Afr) -- Var. *pseudorutilus* Benn. (var. *rutiloides* (Fern.) Boivin; *P. strictifolius* Benn.) -- Stipules with stronger nerves, soon disintegrating to fibrous shreds. Basal foliar glands usually lacking. -- seK-(Mack-Y), Q-O-(Man)-S-(Alta), US.

According to R.R. Haynes in *Rhodora* 76: 598-9. 1974 var. *pseudorutilus* has priority at varietal rank, hence the nomenclature adopted above. Both of our varieties are largely sympatric, but var. *pseudorutilus* seems less widely distributed.

10. *P. obtusifolius* Mertens & Koch -- Like the last with

larger leaves and a more conspicuous midrib, whitish and about 0.5 mm wide towards the base. Leaves less than 1 dm long, rounded and mucronulate at tip, with a pair of bulging, marginal and translucent glands at base. Stipules rather conspicuous, 1-2 cm long, at least half as wide as the leaves, whitish and filmy, not disintegrating to fibers. First half of summer. Small ponds and quiet waters. -- (NF), NS, (NB)-Q-BC, US, Eur.

Our only known Manitoba (TRT) collection was originally reported as P. Friesii by Baldwin 1953 and Scoggan 1957.

11. P. epiphydrus Raf. (var. Nuttallii (C. & S.) Fern.) -- Stem and petioles strongly flattened, about 4 times wider than thick. Leaves dimorphic, the submerged ones ribbon-like, distichous, 1-2 dm long and 5-10 mm wide. Achene with a narrow dorsal wing and concave sides. Mid summer. Mostly in lakes, rare: Lily Pond and other lakes in the southeast corner, then at The Pas and Denare Beach. -- Aka, L-SPM, NS-S, BC, US, (Eur).

12. P. alpinus Balbis var. subellipticus (Fern.) Ogden -- (var. tenuifolius (Raf.) Ogden) -- The whole plant tinged reddish-brown, growing in acid waters which are often also tinged red. Stem almost invariably simple. Leaves narrowly lanceolate, the upper gradually longer and commonly around 1 dm long, about twice as long as the lower. Upper leaves \pm rounded at tip. Floating leaves usually lacking, if present shorter than the submerged leaves, \pm oblanceolate, tapered to a petiole which is usually less than half as long as the blade. Body of the achene 3.0-3.5 mm long. Mid summer. Frequent in boggy creeks. -- G, K-Mack-(Y)-Aka, L-NF, NS-BC, US.

The typical phase is European and differs in a weak sort of a way by its smaller fruits and longer leaves. Body of the achene 2-3 mm long. Upper submerged leaves usually 1.2-1.5 dm long.

12X. P. alpinus X gramineus -- Has been reported from Churchill. -- (O-nMan).

13. P. amplifolius Tuck. -- Submerged leaves largest, conduplicate-falcate and petiolate, the upper 1-2 dm long, 3-5 cm wide, broadly lanceolate. Floating leaves often present, with a much longer petiole and rather like those of P. natans except for the finer and more numerous nerves. Stipules 5-12 cm long. Mid summer. Deeper lake waters at Bisset, Limestone Narrows, and possibly elsewhere. -- NF, NS, NB-eMan, BC, US.

The basis for the Saskatchewan reports by Breitung 1959 and Russell 1944, 1954 was a collection by O.C. Furness from Waskesiu Lake (SASK). It has been revised to P. natans.

13X. P. methensis Ar. Benn. -- Hybrid of the following, possibly with the preceding. Submerged leaves sessile, the upper about 2 dm long and 2 cm wide, flat and with 7-9 nerves,

the lower leaves gradually smaller down to about half. Stipules 3-6 cm long. Methye Portage. -- NS, S.

This unusual collection (CAN) looks like a hybrid of dubious parentage. P. gramineus could be one of the parents, but the other is less obvious. It might be P. amplifolius or P. illinoensis if either were known from the area around Methye Portage.

14. P. gramineus L. (var. graminifolius Fries; P. heterophyllus AA.) -- Leaves strongly dimorphic, the submerged ones light green, less than 1 cm wide and mostly around 5 cm long, the floating ones at least twice as broad. Stem rather thin, strongly contrasting the thick and short peduncle. Usually branching, and often very much so, the leaves then dimegueth, the rameal ones being only half as long as the stem leaves. Mid summer. Stagnant waters. -- (G), K-Aka, L-SPM, NS-(PEI)-NB-BC, US, Eur.

P. illinoensis Morong (P. angustifolius AA.; P. lucens AA.) -- Rather similar to P. amplifolius but the leaves not quite so large, narrowly lanceolate, flat and with fewer nerves. Submerged leaves all sessile or the upper on a petiole usually under 2 cm long. Peduncle thickened and often very long. Late summer and early fall. Still waters, 2-3 m deep. -- sMack, (NS), Q-0, (BC), US, (CA).

This species was originally included in our text because of earlier Manitoba reports later discounted by Cody and Porsild in the Blue Jay 25: 28-29. 1967. An entry by Moss 1959 was merely speculative. While this species is not definitely known to occur in our area, its known distribution surrounds us in such a way that it appears likely to turn up in the eastern or northern parts. On a speculation we have retained it in the key and in the text, although unnumbered.

15. P. natans L. -- (Epi d'eau, Herbe à la Perchaude) -- Submerged leaves reduced to their petiole (0.5)-1.0-(2.5) dm long, the floating ones elliptic. Stem typically simple. Petioles longest, longer than the blades, becoming thinner, paler and a bit crooked in the last few millimeters near the junction with the blade. Stipules 4-10 cm long, pale and conspicuous. Leaves all or mostly subcordate at base. Summer. Quiet waters of muddy-bottomed lakes, up to 3 m deep. -- (G), sw-Mack, Aka, NF, NS-BC, US, (SA), Eur, (Afr, Oc).

16. P. praelongus Wulfen -- Leaves all submerged, the longer ones at least 1 dm long and shallowly cordate-clasping at base. Stem very light green to whitish, usually simple or nearly so. Leaves up to 2 dm long, lanceolate or narrower, crisp, rounded at tip. Peduncle usually 1-3 dm long. Early summer. Deeper (up to 5 m) lake waters. -- (G, swK)-Mack, (Aka, L-NF), NS-BC, US, (CA), Eur.

17. P. perfoliatus L. var. Richardsonii Benn. (P. Richardsonii (Benn.) Rydb.) -- Like the last with the leaves smaller, not over 1 dm long and deeply cordate clasping. Stem often branchy above and bearing many inflorescences. Stipules soon disintegrating into a group of whitish fibers. Leaves distichous, \pm lanceolate and crisp-margined. Early summer. Common and ubiquitous submerged aquatic. -- Mack-Aka, L, NS, NB-BC, US.

In our variety the leaves are more elongate, commonly 5-10 cm long, \pm lanceolate, broadest at the clasping base, gradually tapered to the acute tip, crisp-margined; stipules soon turning whitish and disintegrating to fibrous remnants. Grades imperceptibly into, and only arbitrarily separable from, the more eastern and Old World var. perfoliatus (including var. bupleuroides (Fern.) Farw.) with suborbicular to elliptic leaves 2-5 cm long, usually obtuse or rounded at tip, little if at all crisp-margined; stipules filmy and evanescent.

134. LILAEACEAE

(LILAEA FAMILY)

Flower reduced to a single stamen and/or ovary. Fruit a single achene which arises from an ovary possibly unilocarpellate or perhaps compound of 3 carpels.

1. LILAEA Humb. & Bonpl.

Some of the flowers subtended by a small appendage which is either a bract or a lone sepal. Flowers partly unisexual. Pistillate flowers of two kinds, those from the lower part of the spikes have sessile stigma, those from among the leaf bases have filiform styles longer than the leaf sheaths.

1. L. scilloides (Poiret) Haum. -- Inconspicuous and soft, pale green, tufted herb. up to 3 dm high. Leaf with a whitish sheath 2-5 cm long. Flowers mostly in greenish spikes borne on scapes about half as high as the leaves. Fruits from the basal flowers 3-pronged at summit. Summer. Mud of drying arroyos and shores; rare or overlooked. -- sS-sAlta-BC, wUS, (CA, SA).

We have seen Canadian specimens from B elanger (DAO), Spring Valley (DAO), Trossachs (DAO, MT), Cypress Hills in Alberta (DAO), Manyberries (DAO, GH), Alberni (CAN, GH, UBC, V) and Pitt River (GH, UBC, V).

The relationships of this monotypic family are in much doubt. In a recent paper K. Larsen, Bot. Not. 119: 496-7. 1966, has given a plausible argument for placing it near Triglochin.

135. RUPPIACEAE

(DITCH - GRASS FAMILY)

Perianth lacking. Carpels many, becoming very long stipitate at maturity.

1. RUPPIA L.

DITCH - GRASS

Inflorescence a spike reduced to 2 flowers on a filiform rachis which elongates greatly. Flower of 2 stamens and of 4 or more carpels.

- a. Leaves 1-2 dm long; sheaths 1.5-4.0 cm long
 2. R. occidentalis
 aa. Leaves and sheaths shorter 1. R. maritima

1. R. maritima L. -- Ditch-Grass, Widgeon-Grass (Persil d'eau, Rupelle) -- Carpel on a filiform stipe which elongates to 0.5-2.0 cm at maturity. Habitally similar to Potamogeton pusillus, with filiform leaves and stipular sheaths, but the leaf adnate to the sheath and the reduced inflorescences axillary. Peduncle of the inflorescence 1-5 cm long, rarely longer, little if at all coiled. Achene ovoid, about 2 mm long. Early summer. Alkaline slough at Mortlach and possibly also elsewhere. -- L-SPM, NS-0, S, wBC, US, (CA), Eur.

For our area we have been able to check the Mortlach (DAO) collection, but the Lestock (DAO) specimen reported by Russell 1937, 1944 and Breitung 1957 has been revised to R. occidentalis.

2. R. occidentalis Watson -- The filiform peduncle of the inflorescence well over 1 dm long and soon becoming spirally coiled, the numerous coils about 1 cm in diam. Stipe of the fruit 1-6 cm long. Early to mid summer. Alkaline sloughs, in shallow to deeper (2 m) water. -- Aka, sMan-S-(Alta-BC), US.

"

Order 78. NAIADALES

Perianth lacking, each flower subtended a sheath-like bract. Stamen solitary and the inconspicuous flower otherwise reduced to its bare essentials.

- a. Carpels many; leaves not broader at the base
 135. Zannichelliaceae
 aa. Carpel solitary; leaves with a broadened base
 136. Najadaceae

136. ZANNICHELLIACEAE (ZANNICHELLIA FAMILY)

Leaves opposite. Carpels usually 4.

1. ZANNICHELLIA L.

HORNED PONDWEED

Perennial with axillary flowers.

1. Z. palustris L. -- Horned Pondweed (Alguette, Chenil-lée) -- Resembling Potamogeton pusillus with opposite leaves and

axillary flowers. Leaves filiform, less than 1 dm long. Achenes usually 4, oblanceolate; somewhat falcate. Early to mid summer. Quiet alkaline waters. -- seK, Aka, (NF), NS-BC, (US, SA), Eur, (Afr.).

"

137. NAIADACEAE (NAIAD FAMILY)

Very much reduced type: each flower reduced to either a single stamen or a single carpel containing a single ovule.

"

1. NAIAS L. NAIAD

Base of the flower enclosed in a tubular sheath.

1. *N. flexilis* (W.) Rostk. & Schmidt -- Submerged aquatic with opposite leaves, ribbon-like, but dilated at base into a broadly ovate blade. Annual, mostly around 1 dm long. Leaves 1 mm wide or less, finely serrulate. Fruit axillary, ellipsoid, with a filiform beak about half as long. Early summer. Rare or overlooked in freshwater lakes; a bottom dweller. -- NF, NS, NB-BC, US, Eur.

Rarely collected in Manitoba and Saskatchewan, and the few collections are very widely scattered. It could be a rare plant, but it is an inconspicuous bottom dweller and we speculate that it has been largely overlooked. First reported from our area by Macoun 1888 on the basis of a Fort Pitt (CAN) collection that we have checked in 1962. A second report in Can. Field-Nat. 45: 100. 1931 proved to be a typical hip-pocket specimen of some sterile herb from Hill Island Lake (CAN). It has been revised to *Stellaria calycantha* but the leaves are verticillate and *Galium* might be a better guess. A second collection is our own (DAO) in 1955 some 30 miles north of Candle Lake. These records were overlooked by Russell 1937, 1944, 1954 and Breitung 1957, but acknowledged by Boivin 1967. A more recent report by Argus 1968 from Big Sandy Lake has not been checked. From Manitoba we have seen only the two collections (DAO) reported by Scoggan 1957.

ARTIFICIAL KEY

This artificial key to the Monopsids is supplementary to the more or less natural keys that will be found at the beginning of the *Folliculids* (page 4) and of the *Achenidae* (page 169).

- a. Very small plants, free floating in water and not rooted, normally sterile 128. *Lemnaceae*, p. 162
- aa. Plants anchored by a root system.
 - b. Leaves opposite or verticillate Group A
 - bb. Alternate or all basal, rarely lacking.

- c. Flowers with normal perianth present.
 - d. Ovary superior (or semi-inferior in Zygadenus) Group B
 - dd. Inferior Group C
- cc. Perianth absent or reduced to a single petal or to some very small bracts or mere bristles or setae.
 - e. Nearly all terrestrial plants, the perianth lacking or insignificant and replaced by scaly bracts or the whole inflorescence subtended by a large perianth-like bract Group D
 - ee. Both perianth and bracts much reduced or lacking; nearly all submerged aquatics...Group E

Group A

Leaves opposite or verticillate.

- a. Terrestrial with only 2 (opposite) or 3 (verticillate) large leaves.
 - b. With only 1 flower or the flowers few and umbellate 119. Liliaceae, p. 7
 - bb. With a terminal raceme 123. Orchidaceae, p. 25
- aa. Submerged aquatics with numerous small leaves.
 - c. Leaves 3-10 cm long; carpels and achenes 2-4 136. Zannichelliaceae, p. 181
 - cc. Shorter leaves; fruit a single carpel or a compound ovary.
 - d. Perianth lacking; fruit a single carpel; leaves much enlarged at base. 137. Naiadaceae, p. 182
 - dd. Normally sterile and the leaves of uniform width 115. Hydrocharitaceae, p. 5

Group B

Herbs with normal and obvious flowers and a superior compound ovary.

- a. Perianth small and chaffy 124. Juncaceae, p. 40
- aa. Perianth large or at least with one of the verticils petaloid.
 - b. Carpels free or nearly so.
 - c. Carpels numerous, maturing into so many achenes 131. Alismataceae, p. 169
 - cc. Only 3-6 carpels.
 - d. Flowers in an umbel 114. Butomaceae, p. 4
 - dd. In a raceme.
 - e. Raceme bracted. 116. Scheuchzeriaceae, p. 6
 - ee. Bractless 118. Juncaginaceae, p. 7

- bb. Carpels fused into a compound ovary.
 f. Sepals green; petals blue. 117. Commelinaceae, p. 6
 ff. Sepals similar to the petals and more
 or less of the same color.
 g. Leaves long, stiff and sharp-pointed,
 like so many bayonets ... 121. Agavaceae, p. 24
 gg. Leaves mostly smaller and not
 spinescent 119. Liliaceae, p. 7

Group C

Like Group A, but the ovary inferior.

- a. Deeply submerged aquatic with long, flaccid
 ribbon-like leaves 115. Hydrocharitaceae, p. 5
 aa. Terrestrial with firm leaves.
 b. Flowers strongly zygomorphic .. 123. Orchidaceae, p. 25
 bb. Flowers regular.
 c. Stamens 3; herbage glabrous.. 120. Iridaceae, p. 22
 cc. Stamens 6; herbage villous
 122. Hypoxidaceae, p. 24

Group D

Flowers in dense spikes and closely wrapped or covered by one or more bracts or the whole spike when young partly wrapped into a \pm enclosing bract (= spathe); nearly all terrestrial plants; fruit variable, but mostly of 2 or more fused carpels.

- a. Individual flowers subtended by scally bracts.
 b. Stem solid, mostly triangular .. 125. Cyperaceae, p. 55
 bb. Hollow an cylindrical; each floret subtended by
 a pair of opposite bracts 126. Gramineae, p. 158
 aa. Inflorescence very compact, subtended and often
 more or less surrounded by a bract.
 c. Inflorescence of 2 or more globular heads
 129. Sparganiaceae, p. 164
 cc. Flowers in a single spike.
 d. Bract showy and persistent all summer
 127. Araceae, p. 161
 dd. Deciduous at anthesis 130. Typhaceae, p. 168

Group E

Perianth and bracts lacking or reduced to 4 minute sepals or a single petal. Fruit is usually a single achene, or else a group of not more than 6 achenes.

- a. Leaves all basal 134. Lilaeaceae, p. 180
 aa. Stem leafy.

- b. Inflorescence an emerged spike
 133. Potamogetonaceae, p. 173
- bb. Inflorescence not a spike, often submerged.
- c. Carpels 4, maturing into an umbel-
 liform group of achenes 135. Ruppiaceae, p. 180
- cc. Pistillate flower reduced to a
 single carpel which remains
 enclosed in the leaf sheath;
 leaves larger 132. Zosteraceae, p. 172

ADDENDA AND CORRIGENDA

Pages 3 and 4 -- The pagination in the key refers to the manuscript. The printed equivalents are as follows.

Achenidae	169	Juncales	797 = 40
Cyperales	808 = 55	Liliales	763 = 7
Graminales	879 = 158	Agavales	782 = 24
Arales	976 = 161	Page 4:	
Typhales	980 = 163	Orchidales	783 = 25
Butomales	758 = 4	Iridales	780 = 22
Juncaginales	762 = 6	Haemodorales	783 = 24
Scheuchzeriales	761 = 6	Butomaceae	758 = 4
Commelinales	761 = 6	Hydrocharitaceae	759 = 5

Page 11, line 10 from the bottom -- For "1-2 mm" read "1-2 dm".

Pages 41 and 45 -- Juncus effusus L. is to be added as follows: On page 41, lines 4 and 5 from the bottom should be amended to read as follows:

- cc. Inflorescence borne in the upper quarter.
- d. Tepals (1.5)-2.0-3.0-(4.0) mm high 7a. J. effusus
- dd. Perianth larger, the tepals 4.0-6.0 mm
 high 8. J. arcticus

And on page 45 the following description should be added.

7a. J. EFFUSUS L. -- Soft Rush, Bog-Ruch (Jonc à mèches, Têtes de femme) -- Similar to the next, but coarser and forming dense tussocks, yet the flowers smaller. Stems (6)-8-10-(12) dm high, mostly 2-3 mm thick, stiffly erect, often more than 100 to a clump, clothed at base with brown and bladeless sheaths. Inflorescence compact to very lax, (1)-3-5-(10) dm long. Tepals mainly green, but the margin hyaline and usually with a submarginal line in reddish brown. Capsule small, 2 mm high, brown, usually overtopped by the perianth. First half of summer. Very wet places, mostly at the edge of ponds and streams; rare: Yellowhead Pass. -- (Aka), NF-(SPM), NS-O, swAlta-BC, US, (SA), Eur, (Afr, Oc).

The only known collection (DAO) was made in 1971 along an old road. Said roads runs on top of an abandoned railway grade built in the last century. We speculate that the clump of Juncus effusus was inadvertently introduced long ago with earth fill during the construction of the railway embankment.

Page 43 -- JUNCUS COMPRESSUS Jacq. -- Also at Mink River, Man. (Herb. Krivda) and North Pine River (Herb. Krivda), both collected by M.E. Tyler and presumably duplicated in the Brandon University herbarium.

Page 77 -- Carex sitchensis Prescott is to be inserted as follows in the key.

- c. Scales exerted, being longer than the perigynia.
 - z. Lowermost spikelet (5)-8-(12) cm long and drooping on very long pedicels 108a. C. sitchensis
 - zz. Lowermost spikelet ascending to erect and usually shorter.
 - d. Perigynia ...

Page 84 -- The key to group J is faulty, it should read as follows.

- a. Terminal spike gynandrous 88. C. misandra
- aa. Staminate or androgynous.
 - b. Spikelets red brown, mostly over 1 cm long 87. C. petricosa
 - bb. Spikelets black, mostly 1 cm long or shorter 89. C. atrofusca

Page 146 -- Insert the following paragraph between C. aperta and C. aquatilis.

108a. C. sitchensis Prescott -- Very tall and coarse, its thin and drooping spikelets longest. Usually 1.0-1.5 m high and its deep brown base 1 cm thick or more. Coarsely and deeply stoloniferous. Main leaves (2)-4-6-(8) mm wide, its sheath more or less tinged in red on the ventral side. Inflorescence 2-3 dm long, overtopped by the lowest bract. Spikelets 5-8, of which the upper 2 or 3 are usually staminate, the lowermost strikingly thin and long, becoming moniliform towards the base. Scales broadly lanceolate, somewhat narrower and about half longer than the perigynia, the latter much as in C. aquatilis for size, shape, lack of ventral or dorsal nerves and the mere suggestion of a stipe, about 0.1 mm long. First half of summer. Marshy flats along creeks and around lakes. Cavell Lake. -- sAka, wcAlta-BC, wUS.

Page 142, line 26 -- For "narrowly lanceolate", read "broadly lanceolate".

Page 145 -- The following hybrid was recently detected among specimens formerly filed (DAO) with C. halophila.

103X. C. ungavensis Lep. -- Hybrid of C. Bigelowii X C. salina. About 3 dm, rather coarse and generally similar to C. Bigelowii, but the spikelets longer and the achene sometimes notched. Plant base not deeply rooted and deep red brown at base. Bracts much overtopping the inflorescence. Staminate spikelet mostly 2-3 cm, the pistillate ones mostly 3-4 cm long. Scales blackish with a thin paler midnerve. Churchill. -- (G, L), Q-nMan.

Page 145 -- Carex lenticularis Mx. has been confirmed (DAO) for northeastern Alberta. At GH all BC specimens were revised to C. Kelloggii. We are now inclined to think that the western limit of C. lenticularis is roughly coincident with that of the precambrian outcrops.

Page 146 -- Carex nebraskensis Dewey -- A collection from Morley, Alberta cited as C. Jamesii by Macoun 1888 has been located at GH; the inflation of some of the perigynia was obviously caused by a parasite and the specimen has been revised to C. aquatilis Wahl.

Pages 148-9 -- Carex salina Wahl. -- Both varieties described appear to belong in our area. Some Churchill (DAO) collections have been checked as var. salina, others as var. subspathacea. A Drummond collection (GH) of var. salina probably comes from York Factory. This last collection is labelled "Cumberland House's and Hudson's Bay", but no doubt came from the Hudson Bay coast and presumably from York Factory. Var. salina is also represented from Churchill in the Krivda herbarium.

Some intermediates between C. aquatilis and C. salina occur in our area and elsewhere and some of these could be of hybrid origin. They may be filed as X C. halophila Nyl. and will comprise on the one hand larger plants with most of the characters of C. salina, but with grooved achenes, on the other hand smaller plants with the appearance of C. salina, but the achenes lacking a groove.

The distinction of C. aquatilis vs. C. salina var. salina is usually simple enough because of difference in habitat and because C. aquatilis is often taller (salina: 2-4-(6) dm), its leaves often wider (salina: 1-3 mm), its inflorescence usually longer (salina: 6-15 cm, excluding the bracts), its spikelets commonly longer (salina: 1-2-(3) cm), its scales light brown to

purple-black (salina: deep brown to blackish). But smallish specimens of C. aquatilis do not stand out clearly from the run-of-the-mill C. salina var. salina. Positive identification of C. salina requires liberating a mature seed (not always easy and not always mature) to check for the presence of a groove or notch. On occasion the groove may be shallow and some inflorescences may carry a mixture of grooved and ungrooved achenes.

CONTENTS OF PART IV

Monopsida	1
Natural key to Monopsids	2
Folliculidae	4
Short index to <u>Carex</u>	90
Innovations in <u>Gramineae</u>	158
Achenidae	169
Artificial key to Monopsids	183
Addenda	185
Index of Genera	189

INDEX OF GENERA IN PART IV

- Acorus, 161
 Agropyron, 159
 Agrostis, 159
 Alisma, 170
 Allium, 12
 Anacharis, 5
 Aplectrum, 40
 Arethusa, 32
 Arisaema, 162
 Asparagus, 15
 Butomus, 4
 Calla, 161
 Calochortus, 15
 Calopogon, 36
 Calypso, 40
 Camassia, 15
 Carex, 71, 186
 Cladium, 69
 Clintonia, 16
 Corallorhiza, 38
 Cyperus, 56
 Cypripedium, 26
 Digitaria, 159
 Disporum, 17
 Dulichium, 56
 Eleocharis, 66
 Elodea, 5
 Epipactis, 34, 36
 Eriophorum, 57, 65
 Erythronium, 14
 Festuca, 159
 Fritillaria, 14
 Glyceria, 160
 Goodyera, 34
 Habenaria, 28
 Hypoxis, 24
 Iris, 22
 Juncus, 40, 185
 Kobresia, 70
 Lemna, 163
 Lilaea, 180
 Lilium, 14
 Liparis, 40
 Listera, 33
 Lloydia, 15
 Luzula, 51
 Maianthemum, 17
 Malaxis, 39
 Melica, 159, 160
 Najas, 182
 Orchis, 28
 Panicum, 160
 Poa, 160
 Polygonatum, 19
 Potamogeton, 173
 Rhynchospora, 69
 Ruppia, 181
 Sagittaria, 171
 Scheuchzeria, 6
 Schizachne, 160
 Scirpus, 60
 Sisyrinchium, 23
 Smilacina, 16
 Smilax, 20
 Sparganium, 164
 Spiranthes, 32
 Spirodela, 163
 Stenanthium, 10
 Stipa, 160
 Streptopus, 18
 Tofieldia, 9
 Torreyochloa, 160
 Tradescantia, 6
 Triglochin, 7
 Trillium, 19
 Typha, 168
 Uvularia, 12
 Vallisneria, 5
 Veratrum, 11
 Xerophyllum, 10
 Yucca, 24
 Zannichellia, 181
 Zigadenus, 11
 Zostera, 172